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World Market Integration through the Lens of Foreign Direct Investors

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Abstract

Albuquerque, Loayza, and Servén analyze the unparalleled increase in foreign direct investment to emerging market economies in the past 25 years. Using a large cross-country timeseries data set, the authors evaluate the dependence of foreign direct investment on global factors or worldwide sources of risk (that is, factors that drive foreign direct investment across several countries). They construct a globalization measure that equals the share of explained variation in direct investment attributable to global factors. The authors show that the globalization measure has increased steadily for industrial and developing countries. For the full sample of countries, the globalization measure rose eightfold from 1985 to 1999. Furthermore, in recent years developing countries' exposure to global factors has approached that of industrial countries, particularly for Latin America. Finally, the globalization measure correlates strongly with measures of capital market liberalization. Overall the authors find strong support for the hypothesis of increased market integration which implies a greater role for worldwide sources of risk. They discuss the implications of the results for public policies regarding capital market liberalization and policies directed at attracting foreign investment.

This paper—a product of Macroeconomics and Growth, Development Research Group—is part of a larger effort in the group to understand international capital flows. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Tourya Tourougui, room MC3-301, telephone 202-458-7431, fax 202-522-3518, email address ttourougui@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at albuquerque@simon.rochester.edu, nloayza@worldbank.org, or lserven@worldbank.org. May 2003. (51 pages)

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1 Introduction

Recently, there has been a strong move towards greater integration of emerging market economies into world capital markets. The process of integration starts with the removal of capital market restrictions, most notably the liberalization of foreign investors' participation in domestic stock markets, the listing of domestic firms in foreign markets, and the privatization of state-owned companies.[1] Among the main goals of these reforms are a reduction in the domestic cost of capital and an increase in foreign capital inflows.[2]

There is by now a substantial body of empirical evidence on how the cost of capital responds to a financial liberalization program. The consensus view from that literature is that the cost of capital declines in the post liberalization era. However, this decline is not as large as theory would have predicted, sometimes not even economically or statistically significant.[3]

This paper analyzes the dynamics of foreign capital flows in response to increased integration of capital markets. Our focus on flows rather than prices has two main objectives. First and foremost, the success and continuity of the liberalization reforms depend on the benefits of such programs, which on the basis of the current evidence on prices might be viewed as meager by reform opponents. Of course, it is possible that the noted small price impact also reflects the reforms' imperfect credibility. Ift hat is the case, one would expect flows to behave in a fashion similar to prices, otherwise one would expect flows to increase significantly. Looking at the behavior of flows thus may prove important to distinguish between theories that attempt to explain the small observed price changes after the liberalization. Second, not much is known about the dynamics of international capital flows in connection with the recent period of global capital market

[1] See for example Bekaert, Harvey and Lumsdaine (2001), Marston (1995), and Stulz (1999a). Beim and Calomiris (2001) report official dates of financial liberalization measures and other reforms across several countries.

[2] For example, Errunza and Losq (1985) and Bacchetta and van Wincoop (2000) give theoretical arguments for these effects to occur.

[3] See Bekaert and Harvey (2000), Henry (2000), Chari and Henry (2002), and Stulz (1999b).

integration.[4]

We choose to analyze the behavior of direct investment flows as opposed to portfolio equity flows, or total capital flows. This is done for several reasons. First, foreign direct investment is the fastest growing form of international capital flows and the most important form of private international financing for emerging market economies.[5] To the extent that multinationals are vehicles for improving risk sharing across countries (e.g. Errunza, Hogan and Hung 1999, and Rowland and Tesar 2000), they may be partly responsible for the small price response of domestically listed firms after stock market liberalizations.

Second, low portfolio equity inflows may be a reflection of the weak development of the domestic capital markets as opposed to a lack of interest in pursuing greater diversification by foreign investors. In fact, many local companies in liberalizing countries have chosen to list elsewhere in order to reach foreign investors directly in their home market. In contrast, while in many ways foreign direct investment behaves as equity, it does not rely exclusively on the existence of developed domestic stock markets. Third, many foreign investors might choose to invest in emerging economies' equity by trading on country funds or ADRs listed in the New York or London markets. While the existence of these assets allows for the desired risk sharing (see Errunza, Hogan and Hung 1999), it also makes it difficult to track portfolio capital flows across countries. This criticism is particularly relevant for the vastly used US Treasury International Capital dataset.

Our analysis relates the driving factors of foreign direct investment to the observed increased integration of capital markets. To motivate this connection we argue that

[4] A recent study by Bekaert, Harvey and Lumsdaine (2002) finds that after a liberalization equity flows increase by an annualized rate of 1.4% of market capitalization, but drop 3 years after by 0.55%.

[5] As a fraction of world gross domestic product, total private capital inflows to emerging markets grew from a steady annual average of 1.3 percent in the period from 1976 to 1989 to an annual average of 2.0 percent in the period from 1990 to 2000, representing a 56 percent increase. In this process foreign direct investment flows increased significantly more than portfolio equity or bond flows. The average annualized growth rate of foreign direct investment was 17 percent in the period from 1976t o 2000 whereas the corresponding figure for all private non-direct investment flows was 7.6 percent (authors' computations using data from the World Bank World Development Indicators 2002 for low and middle income countries).

increased integration brings the world economy closer to an equilibrium with perfect risk sharing. In the polar case of perfect risk sharing only aggregate or global risk matters, because risk from local factors can be diversified away. This means that domestic returns, wage and interest rates, and consumption all depend only on global factors. In the opposite extreme polar case of fully segmented capital markets, investors can only hold their own country's assets and must bear allt he risk from local factors. Thus, domestic prices and quantities depend only on local factors, and trivially, in this polar case there are no international capital flows. In the more realistic intermediate case of partially segmented capital markets, local and global risk factors impact domestic prices and quantities as well as the decisions of foreign (and domestic) investors.

We build an empirical model of foreign direct investment that nests several theories and estimate it using a large cross section and time series data set of developing and developed countries. Particular care is put in identifying and motivating the role of global and local factors as drivers of direct investment. Global factors cause foreign direct investment to change across several countries, whereas local factors are country-specific and have no direct or indirect impact on foreign direct investment into other countries.[6] To the best of our knowledge this is the first paper that studies the relevance of global factors as determinants of foreign direct investment.

We proceed by estimating the exposure of countries, and the level of direct investment, to global factors. To do this we construct a measure oft he explained variance in foreign direct investment that is due to variation in the global factors. This we call the globalization measure. To construct the globalization measure we make the identifying assumption that each country is small relative to the world economy, which implies that local factors may have a global component themselves, but the reverse is not true, i.e., there is no feedback from local factors to global factors. Our empirical approach uses

[6]In related literature Calvo, Leiderman, and Reinhart (1993), Fernandez-Arias (1996), and Calvo and Reinhart (1996) analyze pull versus push factors in total capital flows emphasizing the role of US short term interest rates. Griffin, Nardari and Stulz (2001) analyze pull versus push factors in portfolio equity flows. The definitions of pull and push factors are usually tied to the geographic location of the factors. This is not the case in our analysis so we choose not to use the same concepts for clarity.

both the time series and cross sectional dimension of the data. We re-estimate the investment model over moving windows of 16 years of data and use the re-estimated model to compute the globalization measure. This approach accommodates the difficult problem of identifying structural breaks, and possibly multiple breaks, in a large cross section of countries and with many variables.[7]

Consistent with the hypothesis of increased world capital market integration, the analysis reveals that global factors have increased in importance in explaining the dynamics of the cross section of foreign direct investment and the level of aggregate foreign investment over time for developing and developed countries. For the full sample of countries in 1999, the globalization measure was 62 percent, which represents an 8 fold increase since 1985. Furthermore, developing countries' exposure to global factors has increased faster than that of developed countries and the gap is narrower at the end of the 1990s, particularly so for Latin America. Interestingly, we find a significant decline in global factors as drivers of direct investment around the time of the debt crisis of the 1980s for developing and developed countries alike, but no noticeable change due to the recent Mexican, Russian, or East Asian crises. Finally, using the liberalization variables in Bekaert, Harvey and Lundblad (2002), we show that our globalization measure is explained to a significant extent by the level offi nancial liberalization.

The increased exposure to global factors that we find is associated with increased flows of direct investment into emerging market economies. While these findings constitute evidence of greater worldwide market integration, we also find that growth in local productivity, trade openness, financial depth, low government burden, and macroeconomic stability are important domestic drivers.

The sequence oft he paper is as follows. Section 2 briefly presents severalt heories of foreign direct investment. This section appeals to appendix A for three case studies (Enron International, Intel International, and Johnson and Johnson) intended at providing explicit examples of global factors at work as drivers of foreign direct investment and to

[7]See for example Bekaert and Harvey (1995), and Bekaert, Harvey and Lumsdaine (2002) for alternative approaches.

appendix B for a simple empirical model of foreign investment. Section 3 presents the results from our analysis. Finally, section 4 concludes with a discussion of the public policy implications of our findings.

2 Modeling Foreign Direct Investment

We discuss several theories of foreign direct investment placing particular emphasis on recent work on capital market issues. These theories will be subsequently embedded in an empirical framework.[8]

A. Taxes, Wage Rates, and Tariffs

Countries that want to attract a foreign direct investor usually have to compete with other countries, which represent feasible alternatives to the investor, by offering generous benefit packages (usually this includes the country of origin of the multinational). These packages include, among other things, tax holidays, guarantees of a stable labor market generally with low or fixed nominal wage rates, and the provision of high quality transportation or communications infrastructures.

A multinational company might also be interested in producing in a country because of the location of its product market. For example, high domestic import tariffs make it too costly for the multinational to export its products from a foreign country. Alternatively, the multinational can produce domestically for the local market (see, for example Kindleberger 1966 and Horst 1973).

B. Expropriation Risk and Inalienable Assets

[8]The reader is referred to Caves (1996) for a comprehensive review of theories and empirical tests on direct investment. Outside of the scope of our empirical modeling is the role of asymmetric information in promoting foreign direct investment (e.g. Razin, Sadka, and Yuen 1999 and Tesar and Hull 2000). Another issue not pursued here is the use of transfer pricing by multinationals to reduce income taxation at the parent level (e.g. Casson 1979). Moreover, due to their use of different financial instruments in funding investments (i.e., debt and equity at home and abroad), multinationals might be better equipped to do tax arbitrage across countries and assets (e.g. Hodder and Senbet 1990, and Mills and Newberry 2002).

Participation in international capital markets has obvious risks to investors, most notably the risk ofd irect or indirect expropriation.[9] Countries not only expropriate foreign direct investors, but also international debt creditors and portfolio equity investors. The risk of expropriation naturally gives rise to financing constraints because international investors perceive the increase in the likelihood of expropriation as more capital is funneled in. Importantly, foreign direct investment is harder to expropriate, because it is usually attached to intangible assets which are themselves hard to expropriate (Eaton and Gersovitz 1984 and Albuquerque 2002).[10] In Albuquerque (2002), this leads to a default premium that is smaller for foreign direct investment, to relatively greater inflows of foreign direct investment and to direct investment being less volatile than other flows.

C. Wealth Effects

Changes in the real exchange rate affect the relative wealth levels of foreign and domestic investors and may further lead to changes in investors' actual relative purchasing power. Froot and Stein (1991) showed that in order for changes in exchange rates to change the relative purchasing power of domestic and foreign investors, these investors must be subject to binding financing constraints. If not, additional money could be borrowed that re-establishes their original purchasing power. In their setting, a real appreciation of the foreign currency increases the purchasing power of foreign investors and leads to more direct investment.

2.1 An Econometric Model of Foreign Direct Investment

The upshot of the preceding discussion and of the simple model developed in appendix B is the following equation for aggregate optimal foreign direct investment flows into a

[9] Examples of indirect expropriation include the levying of high unexpected profit taxes, the imposition of restrictions on capital outflows, or the real devaluation of the local currency.

[10] Examples of intangible assets include blue prints, managerial skills, and marketing networks.

country:

$$\begin{aligned}\ln I_t &= c_0 - c_1 \ln R_t + c_2 \ln A_t - c_3 \ln w_t + c_4 \ln p_t \\ &\quad + c_5 \ln \beta_t + c_6 \ln \frac{x_t}{x_{t-1}} + \gamma_1 \sigma^2_{t,x} + \gamma_2 \sigma^2_{t,A} + \gamma_3 \sigma^2_{t,w}. \qquad (1)\end{aligned}$$

In this equation I_t is the level of direct investment inflows, A_t is the domestic productivity level, w_t is the wage rate, R_t is the domestic cost of capital, $1 - p_t$ is the probability of expropriation of foreign investors, β_t is the stochastic discount rate used by foreign investors to discount future flows,[11] and x_t is the real exchange rate measured in units of foreign currency per unit of domestic currency. The remaining terms reflect the possibility that the drivers of direct investment display autoregressive conditional heteroskedasticity.

According to the model in appendix B and the theory discussion above, the coefficient $c_1 > 0$, and $c_2 - c_5$ are all predicted to be positive if the corresponding variables display positive persistence. According to Froot and Stein (1991) $c_6 < 0$. As in their setting, this is also the case here if the future value of the real exchange rate is independent of today's value. However, if the rate of change of the real exchange rate displays positive persistence, a high value of the domestic currency today signals an even higher value tomorrow and high future profits measured in foreign currency units. In this case $c_6 > 0$. Therefore, the sign on the change in the real exchange rate is theoretically ambiguous.

Inspection of (1) clarifies what are the local and global factors driving foreign direct investment. Local factors are captured by the percentage change in the real exchange rate, the domestic productivity shocks, and the domestic real interest rate and wage rate. In the estimations below we allow for a larger set of local factors. Importantly, these local variables are driven by (or represent) local factors only to the extent that they are orthogonal to the global factors. In fact, in a general equilibrium complete markets model without capital market frictions the real exchange rate, the wage rate, and other local variables are only functions of the global factors (or state variables). But, to the extent that the world is partially segmented these local variables will contain important

[11] In the Consumption-CAPM model the stochastic discount factor equals the marginal rate of intertemporal substitution.

localc omponents as well.[12] For example, country productivity shocks are known to have significant global components (e.g. Glick and Rogoff 1995, and Iscan 2000). Thus, we may write

$$\ln A_t = \alpha_0 \ln A_t^G + \alpha_1 \ln A_t^L,$$

where A_t^G and A_t^L stand for the global and local components of domestic productivity respectively. Below we use these ideas in constructing our globalization measure which captures the size of the global exposure in foreign direct investment.

Importantly, the stochastic discount rate used by foreign investors to discount cash flows from local subsidiaries (β_t) is driven by global factors. In general, the discount factor varies with state variables or factors that impact the foreign investor's intertemporal rate of substitution. Some of these factors might also be local sources of uncertainty if markets are incomplete. If this country risk cannot be diversified away we may write

$$\ln \beta_t = \lambda_0 \ln \beta_t^G + \lambda_1 \ln \beta_t^L. \tag{2}$$

What global factors capture the variation in discount rates?T his question is a difficult one to answer as it presumes that we have a fully specified general equilibrium model to identify these factors. Often researchers have chosen to view the global factors as unobservable (e.g. Harvey 1991, and Campbell and Hamao 1992). This is also our first route.[13] We estimate latent, or unobserved, factors from a set ofg lobal variables $\mathbf{Z}_t^G$:[14]

$$\ln \beta_t^G = \mathbf{b}' \mathbf{Z}_t^G. \tag{3}$$

The number of rows in matrix b indicates the number of relevant global factors acting through the discount factor. Under the assumption of a representative international investor, estimation of (1)-(3) across many countries yields a system of equations with

[12]This is a natural assumption, because foreign direct investment is to some extent an outcome of transactions costs and capital market imperfections (see for example Caves 1996).

[13]The same identification issues apply to local factors, but because there is no good way of imposing restrictions on these we assume they are observed.

[14]In picking these global variables we constrain ourselves to use the instruments that have been shown to explain the cross section of international equity returns.

cross equation restrictions coming from b. One way to impose these restrictions is to first estimate the global factor using principal components and then use it in the system of equations described by (1)-(3).

The empirical section that follows also presents results from a model which is estimated under the assumption that we, as econometricians, observe the global factors. In this approach we use the same global variables that were used in the principal components analysis as the *de facto* global factors. In the robustness section we estimate the latent global factor with GMM by imposing the cross equation restrictions directly in the estimation of the investment equation (1).

3 Empirical Analysis

In this section, we implement and estimate the model described in equations (1)-(3) using cross-country and time-series data. Through this country-level exercise we examine the significance of various theories on the determinants of foreign direct investment discussed above. Furthermore, we use the estimated model and the globalization measure to ascertain the relative importance of local and global factors in explaining the variation of foreign direct investment. By examining the time series behavior of the globalization measure and how it differs across industrial and developing countries, we derive conclusions on how the process of market integration is affecting the behavior of foreign direct investment.

This section is organized around the major empirical objectives and corresponding exercises outlined above. First, we present the variables included in our empirical model of foreign direct investment and provide their basic descriptive statistics. Second, we discuss the results of foreign direct investment regressions for various country samples and different restrictions on country-specific parameters. And third, we report and discuss the variance decomposition results and the globalization measure.

3.1 Definition of Variables and Descriptive Statistics

The empirical specifications that we present below relate foreign direct investment inflows, measured as a percentage of gross domestic product (GDP), to global and local factors.[15] To characterize the global factors we use a set of global variables $\mathbf{Z}_t^G$ that summarize the array of returns faced by international investors. These variables have been used to explain the cross section of both international and US expected equity returns (e.g. Campbell and Hamao 1992) and include the US T-bill rate, an index of total return in world stock markets, the slope of the US yield curve, the US credit spread and the rate of growth ofw orld per capita GDP, which provides a proxy for global productivity growth. To transform the nominal returns in the T-bill rate and the stock market index into real returns we include the US inflation rate among the global variables as a measure of inflation expectations. However, because realized inflation provides a noisy measure of anticipated inflation, in the regressions we do not restrict it to enter subtracting from the nominal rates of return.

As suggested above, we work both with the entire list of global factors, which assumes that these are observable, and with a synthetic measure of these variables, which assumes that the global factors are unobservable, constructed using a principal components procedure. We build the synthetic measure as a weighted sum oft he principal components of the set of global variables, with the weights given by the fraction of the overall variance explained by each of the components. We call the resulting variable synthetic global factor.[16]

Our selection of variables used to describe the local factors reflects the variety of views on the determinants of foreign direct investment outlined in the previous sections. In our basic specifications we include a totalo fn ine local variables in $\mathbf{Z}_{jt}^L$. These are: per capita GDP growth, as a measure of domestic productivity growth;o verall tax pressure, proxied

[15] Appendix C contains a detailed description of our data and its sources.

[16] We apologize for the abuse in notation. In terms of our notation in section 2t he first approach assumes $\mathbf{b}$ is the identity matrix, whereas the second approach assumes that $\mathbf{b}$ is composed by the weights described in the text.

by public consumption relative to GDP, which we would expect to have a negative impact on foreign direct investment; financial depth, measured by the ratio of credit to the private sector as a percentage of GDP, to assess the role of the domestic credit sector in attracting foreign direct investment; the rate of change of the real exchange rate, to capture possible wealth effects; institutionalq uality, proxied by the Freedom House Civil Liberties index, as a measure of the strength of property rights and the absence of corruption, which should have a positive effect on foreign direct investment if it is related to the probability of not expropriating foreign investors; trade openness, reflecting the recent literature on the complementarity of trade and foreign direct investment (specifically, we use the residuals from a regression of the ratio of total trade to GDP on the log of population, country area, and an oil exporters dummy); and, finally, three variables which attempt to measure uncertainty through the volatilities of the growth rates of real per capita GDP, the real exchange rate, and the terms of trade, all of which should be expected to affect foreign direct investment negatively (recall that these uncertainty-related variables are implied by our model in appendix B if there is conditional heteroskedasticity). Below we also allow for other variables such as the domestic wage rate for which we have limited data.

The sample of countries used in our analysis is dictated by data availability only. We include in our data set every country possessing at least three observations for each of the variables listed above within the period ranging from 1970 to 1999. This yields 94 countries with a combined total of over 1,900 observations. Of these, close to one-fourth correspond to 20 industrial countries, while the rest correspond to the 74 developing countries in the sample.

Table 1 presents descriptive statistics for the overall sample. As the table suggests, the data set contains a few negative numbers for the ratio of foreign direct investment to GDP which correspond to episodes of disinvestment. The largest negative values for foreign direct investment belong to Panama in 1987-88. There are also some large positive values reflecting foreign direct investment into small economies, with the largest

one corresponding to Equatorial Guinea.

3.2 Regression Results

To implement (1) we introduce a random error and country-specific effects. The country-specific effects are needed due to the diverse set of countries in our sample. We also perform our regressions using the share of foreign direct investment on domestic GDP rather than the logarithm of foreign investment to control for size. As discussed above, we present estimates for two models. In the first model we restrict the coefficients on all global and local variables to be the same across all countries. Letting $\mathbf{Z}_{tj} = \left[\mathbf{Z}_t^G, \mathbf{Z}_{tj}^L\right]'$, the corresponding regression equation is

$$\frac{I_{tj}}{GDP_{tj}} = \delta_0 + \delta_j + \boldsymbol{\eta}'\mathbf{Z}_{tj} + u_{tj}, \qquad \text{(Model 1)}$$

where the indices t and j represent time and country, respectively.

In the second model, we allow both country-specific intercepts and country-specific slope coefficients on the global factor, but restrict the coefficients on local variables to be the same for all countries. In this case, the regression equation becomes,

$$\frac{I_{tj}}{GDP_{tj}} = \delta_0 + \delta_j + \boldsymbol{\eta}_j'\mathbf{Z}_t^G + \boldsymbol{\eta}^{L\prime}\mathbf{Z}_{tj}^L + u_{tj}. \qquad \text{(Model 2)}$$

Given that the values of global variables are the same for all countries at a given point in time, the first model may understate the importance of global factors in explaining the variance of foreign direct investment by restricting the variability of the global component across countries. The second model allows for heterogeneous responses to the same global conditions, which increases their predictive power on foreign direct investment at the potential cost of reduced estimation efficiency.

3.2.1 Model 1: Homogeneous Slope Coefficients

The results from estimating Model 1 are presented in Tables 2 and 3. In the first of these we include each of the six global variables independently in the regression. In the

latter one, we replace the global variables by the synthetic global factor, discussed above. We work with three samples of countries –all, industrial, and developing countries– and report their results in each column of both tables.

First, consider the case when the global variables are included independently in the regression (Table 2). For the sample of all countries the overall fit of the regression ($R^2 = 0.45$) is substantial given the large number of observations (over 1,900). Not surprisingly, much of that is due to the country-specific effects. In fact, the within-country R^2, which measures the ability of the model to explain the changes in the dependent variable within a given country, is 0.13. There are interesting differences between the industrial and developing country samples regarding the fit of the regression. The overall R^2 is about 20 percent larger for developingt han for industrial countries. However, the within-country R^2 for industrial countries is more than twice as large as that for developing countries. Therefore, relative to industrial countries, the level of foreign direct investment in developing countries appears to vary more across countries, and their changes in foreign direct investment are less predictable.

Let us consider the results on the global variables. For the three samples under consideration, the results are similar.[17] Both the T-Bill rate and the slope of the US yield curve always have negative and significant coefficients. The growth rate of world per capita GDP is negative in all samples and significantly so, except in the sample of industrial countries. (Its lack of significance in the developed-country sample may be due to the fact that, given their large size, developed countries' own growth rate is heavily correlated with the world rate of growth, thus confusing global and local factors.) An increase in these three variables denotes an improvement in the performance of international assets. The fact that both the T-bill rate and the slope of the US yield curve carry negative and significant coefficients indicates that FDI flows respond to both short- and long-term global investment returns (and not just short-term US interest rates as Calvo et al., 1993, found for total private capital flows or as Bekaert, Harvey and Lumsdaine 2002 found for

[17]The U.S. inflation rate is only used as a control variable, and we do not discuss its related results.

US portfolio equity flows). The US credit spread does not carry a statistically significant coefficient, which may be explained by considering that an improvement in the return of high-yield assets is likely to be accompanied by a correspondingly large increase in their risk. In net, therefore, an increase in the return of high-yield global assets does not distract FDI flowing to local markets. A similar explanation applies to the lack of significance of the index of world stock market returns: an increase in the index not only denotes an increase in returns but may also signal an increase in the associated risk. At any rate, the last two results are surprising in light of the evidence in Griffin et al. (2001) for US portfolio equity flows who find a significant impact of US returns as push factor for US equity flows.

Turning to the local variables, the results for the three samples are similar with a few interesting discrepancies. In the three samples of countries, the growth rate ofG DP per capita and the measure of trade openness present positive and significant coefficients, while the size of government consumption carries a negative and significant coefficient. The size of these effects appears to be stronger in industrial than developing countries. Improvements in overall productivity (as reflected in higher economic growth) and larger trade openness serve to attract foreign direct investment into the country. Conversely, a worsening in the burden of government (through higher taxation, for instance) acts as a deterrent for foreign direct investment flows into the country. These findings are largely consistent with other studies (e.g. Singh and Jun 1995 and Fernández-Arias and Hausmann 2000). In turn, the measure of financial depth carries a positive and significant coefficient in the full and developing country samples, but is not significantly different from zero in the industrial country regression. This suggests that improving financial development from poor levels does encourage foreign direct investment into the country, but this effect disappears as financial markets get highly developed.

In the samples of all and developing countries, the volatility of per capita output growth presents a negative and significant coefficient, implying that macroeconomic instability drives away foreign direct investment. The other measures of volatility (of the

real exchange rate and the terms of trade) do not have a significant effect on foreign direct investment inflows in any of the samples. It is likely that their effect is already captured by volatility of economic growth.

The rate of real exchange rate depreciation is likewise insignificant in all three regressions. This contrasts with the evidence in Goldberg and Klein (1998) (who find that foreign direct investment by both Japan and the United States to the East Asian countries in their sample is significantly affected by bilateral real exchange rates) and questions the hypothesis in Froot and Stein (1991). Finally, we find no evidence that the quality of governance, as reflected in the civil liberties index, has an impact on foreign direct investment inflows in any sample.

Table 3 shows the results obtained when the global variables are replaced with the global factor. We conduct this exercise in order to facilitate the comparison with the results on the heterogeneous model below. As explained above, the synthetic global factor is constructed as a weighted average of the principal components of the six global variables. In the calculation of the global factor, all six original variables enter with positive weights. Since the significant global variables carry negative coefficients in the basic regression (see Table 2), it is not surprising that the 'global' principal component also presents a negative and significant coefficient (except in the industrial country sample). As it is measured here, a decline in the synthetic global factor represents less attractive conditions for investment in international markets. The regression results confirm that this acts as a push force for foreign direct investment to flow into local markets.

It is interesting to note that the size of the coefficient on the global factor is three times as big in developing than in industrial countries, and only significant for developing countries. This is to be expected given that international market conditions as proxied by the global factor are to a large extent determined by local conditions in the richer economies and, particularly, the US. In addition, these are also the most integrated economies.

Judging from the regression fit, the global factor appears to be a good summary mea-

sure. In fact the R^2o btained with the synthetic global factor is almost the same as that found using the 6 global variables independently. Moreover, the estimated coefficients on the local variables obtained with the more parsimonious model are quite similar in terms of sign, size, and significance.

3.2.2 Model 2: Heterogeneous Global Factor Coefficients

So far we have imposed the restriction that the global factors have the same effect in all countries. We now relax this constraint and re-estimate the model allowing for different effects across countries. Here we limit ourselves to the synthetic global factor given by the principal components procedure. As an extension, we will consider below joint estimation of the parameters of the direct investment equation and the latent global factor while allowing the impact of the latter to vary across countries.

The results using the synthetic global factor are shown in Table 4. The first column reports the full-sample results. Comparingt he estimates with those obtained under parameter homogeneity, it can be seen that among the local variables the rate of GDP growth and its volatility, as well as the trade openness variable, remain highly significant. The coefficient on government consumption declines somewhat but remains significant at the 10 percent level, while that on financial depth loses all significance. In contrast, the volatility of the terms of trade now carries a significant negative coefficient.

The table alsor eports the mean of the country-specific coefficients on the global factor. For the overall sample it equals -0.0069, not very different from the coefficient obtained from the restricted regression (-0.0053), and strongly significant. However, the individual-country estimates (not reported) are fairly disperse. Of the 94 individual estimates, 56 are negative (of which 16 significant at the 5 percent level) and 38 positive (3 significant).

Columns 2 and 3 in Table 4r eport the estimates obtained in the industrial and developing country subsamples. For industrial countries the results are again fairly similar to those obtained from the restricted specification. The main difference is that the credit

variable now is marginally significant, while the volatility of the terms of trade is not. The average across countries of the impact of the global factor equals -0.0018, very close to the restricted estimate of -0.0015. The individual estimates vary substantially in magnitude and significance. Out of 20, 12 are negative and 8 positive. However, only one of the former is significant at the 5 percent level.

In the case of developing countries (column 3), the main difference relative to the restricted specification regardingt he local variables is that both financial depth and government consumption are now insignificant, while the volatility of the terms of trade becomes marginally significant. The mean of the country-specific coefficients on the global effect equals -0.0078, not too different from the restricted estimate (-0.0061) obtained earlier. Of the individual estimates, 44 are negative (of which 15 significant) and 30 positive (of which 3 are significant). Figure 1 shows the distributions of the individual estimates on the global factor for developed and developing countries. Both are concentrated around -0.01, but the distribution of developing countries is more disperse, with two large values at the right end of the distribution.

3.3 A Globalization Measure

The regressions reported above confirm that foreign direct investment is affected by both local and global factors. However, we are interested in assessing the relative importance of the twoi n the determination of foreign direct investment flows. Furthermore, we want to know if their contributions have changed over time, and whether they differ systematically across different groups of countries.

How much of the explanatory power of our empirical specifications is respectively due to local and global factors? The answer involves a basic identification problem, given that both sets off actors are not mutually orthogonal. Assuming that each country is small relative to the world economy, it is reasonable to infer that global factors are exogenous with respect to local factors. In other words, there is no feedback from local factors to global factors. This identifying assumption allows a decomposition of the explained

variance of the dependent variable into twop arts: one part explained by the global factors, either directly or through their impact on local factors, and another explained by that component of the local variables which is orthogonal to the global variables. Note that only the latter component is truly local(i.e., not affected by global variables).

More formally, to obtain the variation of foreign direct investment explained by global factors, we first regress the local variables on the global factors and take the residuals from that regression as the 'true' local factors. Construct

$$\beta = \frac{Cov\left(\hat{\eta}'\mathbf{Z}^G, \hat{\eta}^{L\prime}\mathbf{Z}^L\right)}{Var\left(\hat{\eta}'\mathbf{Z}^G\right)}.$$

The contribution oft he global factor to explained variation in direct investment is

$$\frac{(1+\beta)^2 Var\left(\hat{\eta}'\mathbf{Z}^G\right)}{Var\left(\hat{\eta}'\mathbf{Z}^G + \hat{\eta}^L\mathbf{Z}^L\right)},$$

which we call globalization measure. By construction the globalization measure lies between 0 and 1 with 1 indicating full globalization with no role for local factors. In computing the globalization measure we exclude from the denominator country-specific fixed effects. Strictly speaking they do not represent an 'explanation' of the observed variation in foreign direct investment, but rather a measure of our ignorance concerning *time-invariant* country-specific ingredients. Thus, the decompositions below refer to the 'within' variation of the data, i.e., after removing the fixed effects.

Toa nalyze how the roles of local and global factors have changed over time, we perform repeatedly the above decomposition by re-estimating Model 1, as specified in Table 2, over a changing time sample. Specifically, we use a moving 16-year window to define the relevant sample for each re-estimation.[18] In each estimation, we use the sample of all countries available in the corresponding time window. Using the estimated parameters, we compute the shares of explained variance by global and local factors for

[18]Note that the country sample may change slightly across re-estimations due to the fact that the panel is unbalanced. For this reason, we experimented also with other alternative procedures, such as windows of growing size, i.e., adding years, but not dropping them, for each re-estimation. The results were qualitatively similar. We find the approach in the text preferable since it accounts for potential sample breaks (see Bekaert and Harvey (1995) for another approach).

the samples of all, industrial, and developing countries.[19] Table 5 and Figure 2 report the globalization measure.

There are two very clear results. The first is that the share of variance explained by global factors or globalization measure has increased notably in the last 15 years, from less than 10 percent to over 60 percent. Furthermore, the increase is statistically significant, as implied by the 95 percent confidence bands shown in Figure 2a, derived from a bootstrapping procedure.

The second result is that the globalization measure has been larger for industrial than for developing countries (Figure 2b). This is natural given that the former are arguably more integrated economies. However, this difference has shrank over the years: fifteen years ago the share of global factors was twice as large in industrial than developing countries, but by the end oft he 1990's the gap was reduced to 30 percent. Indeed, the same bootstrapping procedure used above shows that in the period 1989-93 the estimates of the contribution of the globalf actor for industrial countries lie outside the 95 percent confidence bands (not shown to avoid cluttering the graph) constructed for developing countries, suggesting that the difference between the two sets of countries regarding the role of global forces was significant. After 1994, this ceases to be the case.

Where does the increased importance of the global factors come from? Is it due to the direct impact or its indirect impact via the correlation with the local factors? This is an important question not only because one would like to check that our identification procedure is not eluding the contribution of global factors, but also because for the reasons argued above, according to which we expect foreign direct investment to be more exposed to global factors, we should also expect local variables to also be more exposed to them.

We have decomposed the explained variance by the global factor into the component coming directly from the global factor (i.e., $Var\left(\hat{\eta}'\mathbf{Z}^G\right)$) and that coming from the impact

[19] That is, for a given estimation window, we allow the data but not the estimated parameters to vary across the three samples, i.e., all, industrial, and developing countries. For all samples, we use the estimated parameters corresponding to the sample of all countries. This allows us to focus on the effects of different data on explanatory variables across samples.

of the global factor on the local variables (i.e., $\beta var\left(\hat{\eta}'\mathbf{Z}^G\right)$). For the full sample both sources of variation show a similar pattern, with the indirect role of the global factor increasing from 2 percent to 11 percent of the explained variance. Thus we argue that the direct impact of the global factor is more important, but also that the indirect impact grows as expected.

It is important to note that the ability of the model to explain foreign direct investment inflows (R^2) has increased, though modestly, over the last 15 years. This is shown in Table 5 and also in Figure 3. More remarkable is the rise in the within-R^2, from about 6 percent to over 16 percent, revealing an improved performance oft he model to explain the *changes* in foreign direct investment inflows over time. Throughout the last 15 years the ratio of within- to total-R^2 grew gradually from about one-sixth to close to one-third, implying that our explanatory variables gained predictive power on foreign direct investment inflows relative to the (unobserved) country-specific effects. This complements the evidence in favor of the increasing role of global factors to explain foreign direct investment inflows.

Is the impact of global factors different across regions of the developing world? On the one hand many countries around the world and across Latin America and East Asia have liberalized their capital markets through the last 20 years. On the other hand, policy effectiveness and commitment may have differed substantially across countries and in systematic ways, perhaps due to cultural issues or social rigidities. Figure 4 plots our globalization measure across regions of the developing world: Latin America and Asia. It is apparent from the picture that in recent years Latin America has seen greater exposure to global factors than Asia, a difference of nearly 20 percentage points. One possible reading oft his is that the integration process of countries in this region has been more successful.

3.4 Global Factors and the Level of Foreign Direct Investment

The analysis of the globalization measure reveals an increased exposure of direct investment to global factors. However, it is not informative about how integration has contributed to the increased *level* of flows of direct investment. This effect is shown in Figure 5. The figure plots the ratio of foreign direct investment to GDP, relative to the mean level of direct investment, that would result if it had been driven solely by the global factor. To construct the figure we use the estimates from Model 1 with the synthetic factor and count as the global factor only its direct impact (i.e., we exclude the impact oft he global factor on the local variables).

While foreign direct investment was fairly stable as impacted by global factors until late 1970s, it declined substantially in the early 1980's. This is consistent with the drying up of international capital flows subsequent to the Latin America debt crisis, as suggested by models of sovereign default (e.g. Eaton and Gersovitz 1981). It is also the period of great inflows towards the US economy. The post-1982 period is associated with increased integration ofc apital markets (particular so in the 1990's) and our results show a substantial role of the global factor: foreign direct investment as a share of GDP increased from roughly 0.009 below average in 1982 to 0.004 above average in 1999. These numbers are roughly consistent with those in footnote 5 in the Introduction to this paper that suggested that foreign direct investment as percentage of world GDP increased by 1 percentage point from the 1980s to the 1990s. It should be noted that the results would be even stronger had we included the indirect effect of the global factor acting through the local variables.

3.5 Global Factors and Liberalization

In this subsection we correlate our globalization measure with measures of financial liberalization. We use the liberalization measures in Bekaert, Harvey and Lundblad (2002), official liberalization, first sign and investability plus a measure ofb alance-of-payments restrictions. Official liberalization is a dummy variable that takes the value of one if

the equity market is liberalized based on the chronology in Bekaert and Harvey (2000). First sign is a broader measure that takes the value of one if there is either an official liberalization or ADR and country fund introduction.[20] Investability is the ratio of capitalization of the IFC "investable" to the "global" stocks in a country as in Edison and Warnock (2001). For balance-of-payments restrictions we consider 4 types of restrictions recorded by the International Monetary Fund. They are (i) restrictions on payments for capital transactions, (ii) restrictions on repatriation off oreign investment earnings, (iii) presence of multiple exchange rates, and (iv) restrictions on current account transactions. For each of these categories, the IMF records a score of 1 when restrictions apply, and 0 otherwise. Our proxy is the sum of these scores for a given country and year.

Each of these liberalization variables is country specific while our globalization measure applies for groups of countries. To come up with a proxy for the extent of liberalization in a particular group of countries we compute the weighted average liberalization level for each variable where the weights are the countries' gross domestic product divided by the sum of outputs across all countries.

In table 6 we report the results of regressing the globalization measure on the 4 different indices of liberalization. As expected, the signs of the coefficients are positive for the first three measures and negative for balance of payments restrictions (a high value for balance of payments restrictions indicates low liberalization). Most coefficients are significant at the 1 percent significance level and the R-squares from the regressions are very high (ranging from .5 to .7 for developing countries and are about .16 for industrial countries except when using capital restrictions where the R-square is .6) indicating that a substantial portion of the time series variation of our globalization measure is accounted for by the rise of world market integration. Interestingly, the increased relevance of global factors is much more related to increased liberalization in developing countries than in industrialc ountries.

We view the results presented in table 6 as evidence that increased financial and

[20]For developed countries first sign turns out to be identical to official liberalization.

capital market integration worldwide has contributed to an increased role of global factors in driving direct investment.

3.6 Extensions

In this section we do a roll of extensions and robustness checks to our analysis. Our motivation to have this separate analysis has to do with the lack of high-quality and broad-coverage data on variables representing other explanations for foreign direct investment inflows. We consider, in turn, the relationship of foreign direct investment with the level of local wages, local stock-market activity, the degree of balance-of-payments restrictions, and the occurrence of privatizations. Across all of these alternative specifications we systematically found that our previous results on the role of the global factors are not qualitatively affected.[21]

The results are presented in Table 7, where each column is devoted to a different additional explanatory variable. In the first extension, we consider the level of local wage rates as an additional determinant of foreign direct investment inflows. This variable is measured as average annual wages and salaries in the manufacturing sector, expressed in constant US dollars. The number of observations is reduced by close to 40 percent with respect to the basic regression. However, the main results are preserved in the new regression. The wage variable enters the regression with a negative and significant coefficient, indicating that local labor costs do influence foreigners' decision to invest in the country.

Next, we consider local stock-market activity, proxied by the ratio of stock market traded value to GDP. It carries a positive and significant coefficient, which implies that local stock-market activity and foreign direct investment inflows are positively related. However, given that foreign direct investment is likely to involve transactions on stock-market listed companies, it is difficult to establish the direction of causality between the two variables. Note that when we include this variable in the regression, the sample

[21] Results are available upon request.

size is reduced to less than half. When stock-market activity is included in the regression, private credit –the proxy for financial depth used in the basic regression– loses its significance (and positive sign).

Column 3 presents the results when the occurrence of privatizations is considered as an additional local variable. This is a dummy variable that takes the value of 1 in a given country/year observation when there are positive revenues from privatization transactions in the corresponding country and year. The main drawback of the data set for this variable is that it starts in 1988. We assume that prior to this year the privatization dummy takes the value of zero. This is incorrect in a handful of cases (notably the United Kingdom and Chile) but we believe is accurate in the majority of cases given that the strong drive for privatization across the world started in the 1990's. As expected, the occurrence of privatization carries a positive and significant coefficient, which attests to the importance of foreign participation in the privatization processes, particularly of developing countries. It seems that privatization acted as a catalyst that allowed local factors to exert a stronger pull over foreign direct investment flows.

Next, in column 4 we add a qualitative measure of balance-of-payments restrictions mentioned in the previous subsection. The inclusion of this variable reduces the sample size only slightly, and most results from the basic regression are preserved. As expected, this variable carries a negative (and significant) coefficient, implying that measures designed to control the level and volatility of international flows act as deterrents to foreign direct investment.

Finally, we turn to estimation of the coefficients of the latent global factor, allowing the effects of the latter to vary across countries. Unlike the estimations presented so far, this poses a nonlinear problem due to the presence of cross-equation restrictions forcing the relative magnitude of the coefficients on the six global variables to be the same for all countries - although their *absolute* magnitude may differ across countries.

The results of this model are shown in the last column of Table 7. To make the estimation results more easily comparable with those from previous specifications, we

constrained the coefficients on the global variables to add up to -0.010 while leaving unrestricted the country-specific coefficient on the resulting linear combination of global variables. For want of a better term, we label such coefficient 'global effect'. To make the estimation results easier to understand, note that the estimated impact of any global variable on FDI flows to a particular country is given by the 'global effect' of such country times the coefficient on the global variable in question.

It can be seen from the table that all of the global variables, with the only exception of the stock market return, carry significantly negative coefficients. In turn, the average of the global effect across countries is close to unity and strongly significant. Yet the estimates of the global effect display substantial variation across countries: 62 are positive (of which 23 significant at the 10 percent level or better) and 32 negative (of which 2 significant). As for the local variables, the size and significance of their coefficient estimates are remarkably similar to those reported from the estimation of Model 2 in the first column ofT able 4.

4 Final Remarks and Policy Implications

This paper presents strong evidence that the large increases in foreign direct investment flows and its distribution across countries are associated with increased importance of global factors among industrial and developing countries. This increased relevance of global factors is associated with an increased integration of world capital markets following the many reforms and liberalization programs of the mid 1980's and 1990's.

Our results complement those of papers that find increases in the extent of integration (mainly) after 1990 by studying the behavior of equity returns in several emerging markets. Unique to our paper is the analysis of the integration by looking at capital flows as opposed to prices and by describing the process of integration for emerging as well as developed economies. Carrieri, Errunza and Hogan (2002) show that in the 1990s, significantly more of the variation in returns of 'ineligible' domestic securities can be explained by the world return. Similarly, Bekaert, Harvey and Ng (2002) find that equity

returns display greater correlation with regional and world market returns after 1990, and Bekaert and Harvey (1997) show that global factors (characterized by a similar set of variables as used in this paper) have become more important after liberalizations in explaining stock return volatility in emerging markets.

The paper also makes a contribution to the literature on the determinants of foreign direct investment. We develop theoretical arguments and motivate extensively the presence of global factors as drivers of foreign direct investment. The increased exposure to global factors that we find is associated with increased flows of foreign direct investment into emerging market economies. While these findings constitute evidence of the relevance of global or external factors for foreign direct investment, we also find that growth in local productivity, trade openness, financial depth, low government burden, and macroeconomic stability are important domestic drivers.

The finding that local factors have become less important in accounting for the variation in foreign direct investment should not be seen as an endorsement for an hands-off attitude of local governments towards foreign investment. Much to the contrary. First, our empirical model explains roughly 50 percent of the cross sectional and time series variation in foreign direct investment. It could be that some of the remaining variance in direct investment is coming from local factors that we are omitting and that are largely uncorrelated with global factors. Though we find this hypothesis unlikely due to the extensive list of variables that we use, we cannot completely rule it out. Second, local factors still account for a sizeable amount of variation in foreign direct investment even after excluding the component that is due to the correlation ofl ocal and global factors. Disregarding their role could turn sour particularly in crisis periods. It is during crisis periods that the characteristics of local factors can be determinant to prevent massive outflows. Third, and related to the points above, the dynamics of foreign capital inflows will almost always involve a cross country comparison leading to a selection that in itself is mainly driven by a direct comparison of local factors and possibly also by how these local factors relate to the multinational's own global risk factors. Finally, much of

the integration of capital markets comes from policy initiatives taken from within each country. In many emerging economies, the defense of existing reforms and the pursuit of further liberalization policies represents a challenge for local policy makers that cannot be put off.

A Global and Local Factors in Foreign Direct Investment: Case Studies

There is considerable evidence that multinationals make investment, financing, and cash management decisions at the parent company level. Tests have found that, controlling for local variables, domestic investment responds to changes in such variables as the parent company's aggregate supply ofl iquidity, aggregate debt to equity ratios, and worldwide cost of capital and hurdle rates.[22] For example, Mills and Newberry (2002) show that worldwide tax incentives have led subsidiaries to shift income into the US during 1987-1996 by changing their subsidiaries' leverage.

In this paper,h owever, we inspect the role of global factors which, being outside the control of the multinational, are the drivers of the parent company's aggregate variables. This section discusses three cases of direct investments of multinationals highlighting the role of global and local factors in the decision making process. We view this presentation as particularly interesting since the foreign direct investment literature has not identified any role for global factors up to now, which is reflected in the way empirical analysis is conducted.

Enron International's Dhabol Power Project, India[23]

The Dhabol Power Project consisted of a2 ,000m egawatt power station located at Dhabol, near Bombay. It amounted to a $2.8 billion investment from a joint venture formed by the US energy giant Enron Corporation (with 79.93 percent of equity stake), Bechtel Enterprises Inc. and General Electric's Financial Services (each with equal shares). Construction was expected to start in mid-year 1995 and was expected to be completed by December of 1998.

The global factors: A country's energy sector is very dependent on the domestic business cycle. Thus, Enron viewed its strategy of foreign expansion as a way to diversify

[22]The interested reader is referred to Caves (1996, pp 137-140).

[23]This discussion is based on Eun and Resnick (2001) and in several newspaper articles obtained from the database Lexis-Nexis.

risks inherent with fluctuations in the US business cycle. At the time Enron was also moving into other markets like Bolivia, Brazil, and Italy. A second global factor was that Enron was doing very well in the US and enjoyed easy access to credit from a booming US economy. A third global/regional factor was that, while the project came as an invitation from the Indian government, it provided a client for Enron's Qatar $5 billion project to develop natural gas reserves.

The Local Factors: India's proximity to the Qatar project is itself also a local favorable factor. Another local favorable factor for Enron was that India had an energy deficit, which guaranteed demand for the product. The main risks faced by Enron were political in nature. First, India revealed itself as a labyrinth of bureaucracy to Enron. Second, after long negotiations with the central Indian government, and shortly after construction began in 1995, the newly elected provincial government of the state of Maharastra (where Dhabol is located) stopped construction. The provincial government demanded a say in the deal discussing among other things the pricing of electricity, the amount purchased by its state, and environmental concerns. The project did go ahead, but renewed disputes about tariffs with the state of Maharastra in 2001 forced its shutting down. By this time, Enron had invested $1 billion and was looking for a buyer.

Intel Investment, Costa Rica[24]

In 1996 Intel announced plans to build an assembly-and-test semiconductor plant worth $300 million in Costa Rica. In contrast with Enron's case above, Costa Rica was not viewed as a market itself and all of the output from this factory was to be exported to other countries.

Global factors: Intel's decision to expand production sites is related to its role as primary supplier and developer of semiconductors worldwide. The pace oft echnological cloning in semiconductors dictates that Intel must have a one or two year advantage over its competitors in order to recover the research and development costs in the new

[24]This discussion is based on Spar (1998).

computer chip. Thus, it is critical that Intel can produce quickly enough a large amount of computer chips. Since upgrading existing plants itself takes time, Intel has had the policy of building new factories "every nine months or so" (Spar 1998, pp. 4). Thus, it is the pace of worldwide growth and overall demand for processors that dictate Intel's expansion decisions.

Local factors: Intel favored Costa Rica out of an original list of 12 candidate countries including Brazil, Mexico, Chile, Thailand, and Indonesia. First, Costa Rica displayed an established and trustworthy political system. Second, Costa Rica had a non-union work environment with a reasonable supply of qualified workers.[25] Third, Costa Rica presented itself as a pro-business environment and granted Intel with a fast track permit process that was critical to acceptance. Last, but not least, (though Intel did not get any special tax treatment relative to other foreign investors,) the 8 year exemption of corporate taxes and subsequent 4 year reduction of the tax rate in 50 percent represented significant savings for Intel. Other concessions to Intel included reduced energy rates (through changes in the industrial rate structure) and improved access to the airport and airport facilities.

Johnson & Johnson, U.S.A.[26]

In this last case study we look into a disinvestment decision made by Johnson & Johnson (J&J) in 1998. Accordingt o J&J this decision fundamentally changed the nature of its worldwide manufacturing operations, reducing the number of manufacturing facilities around the world by 36 plants, from 159 tol 23 plants, with a subsequent decrease of 4 percent of the global work force. One thing that is interesting in this case study is that nothing changed at the localf actor level to alter or initiate J&J's decision.

Global factors: "The most significant reconfiguration of facilities in the Company's history," (J&J 1998 Annual Report, pp. 1) could only have made sense in a more in-

[25] Apparently labor market conditions and the recent currency crisis were the deciding factor between Mexico and Costa Rica.

[26] This presentation is based on the company's 1998 and 1999 annual reports.

tegrated world. According to J&J, the worldwide decrease in transportation costs and lowering of trade barriers made production in several countries economically infeasible. Therefore, J&J's new strategy was to move production from a local to a regional configuration, taking advantage of scale economies and low transportation costs. Clearly, the decrease in transportation costs is due to worldwide technological improvements. As for the worldwide movement to lower tariffs, we argue that it too is driven by global factors. Perhaps the most important of these factors is the increased belief (resulting from advances in economic science) that lowering tariffs is a necessary condition to bolster growth. Of course, the decision ofw hich countries to abandon must nevertheless be confronted with local factors that relate to geography, labor costs, tax benefits, and so on.

B A Simple Model of Foreign Direct Investment

In this appendix we elaborate a simple model of foreign direct investment. Consider the investment decision problem of a domestic subsidiary of a multinational corporation (subsidiary for short). The subsidiary is assumed to be fully owned and financed by the parent company. For simplicity the subsidiary lives for 2 periods, t and $t+1$.[27] In period t investment I_t is chosen. In period $t+1$, the productivity shock A_{t+1}i s realized, labor L_{t+1} is chosen and production takes place. Prices are taken as given. There is a unique good produced domestically and all quantities are expressed in units of this good. The domestic consumption good differs from the foreign good available for consumption and investment by the foreign investor.

The multinational discounts profits from the domestic subsidiary π_{t+1} using the discount rate β_{t+1}.[28] This discount rate is measured in units of the foreign good and hence profits received from the subsidiary must be adjusted to reflect changes in the relative

[27] It is straightforward toc onsider an infinitely lived firm. In this case we can solve the first order conditions using a linear approximation. The results from this approximation are similar to our current setup, but the details are more involved.

[28] The discount rate or stochastic discount factor in the Consumption-CAPM model equals the intertemporal rate of substitution.

price of the foreign good or real exchange rate x_t. The expected discounted profits of the local subsidiary in units of the foreign good are:

$$V_t = \max_{I_t} \left\{ -x_t R_t I_t + E_t \left[p_{t+1} \beta_{t+1} x_{t+1} \pi_{t+1} \right] \right\},$$

where

$$\pi_{t+1} = \max_{L_{t+1}} \left[A_{t+1} I_t^{\beta} L_{t+1}^{\alpha} - w_{t+1} L_{t+1} \right],$$

$1 > \gamma + \alpha$ which leads to economic profits to pay for fixed intangible assets owned by the foreign investors, $R_t = 1 + r_t$ is the gross rate of interest for the multinational measured in local currency units, w_{t+1} is the real wage rate, p_{t+1} is the stochastic probability of no expropriation, and V_t is the value of the investment at time t.

The maximization problem described above yields the following first order condition for investment (after incorporating the optimality condition for labor):

$$R_t = \gamma \alpha^{\alpha/(1-\alpha)} I_t^{\gamma/(1-\alpha)-1} E_t \left[p_{t+1} \beta_{t+1} \frac{x_{t+1}}{x_t} A_{t+1}^{1/(1-\alpha)} w_{t+1}^{-\alpha/(1-\alpha)} \right]. \tag{4}$$

The right hand side of (4) gives the marginal cost of an additional unit of investment in local currency units. This cost is equated to the expected marginal benefit of investing which is accrued through additional output in period $t+1$.

To solve for optimal investment assume that all variables are log-normally distributed with multivariate autoregressive conditional heteroskedasticity.[29] Let $\mathbf{Z}_{t+1} = [\ln p_{t+1}, \ln \beta_{t+1}, \ln \frac{x_{t+1}}{x_t}, \ln A_{t+1}, \ln w_{t+1}]'$. Then:

$$\begin{aligned} \mathbf{Z}_{t+1} &= \varrho \mathbf{Z}_t + \boldsymbol{\varepsilon}_{t+1}, \qquad \boldsymbol{\varepsilon}_{t+1} \sim N(\mathbf{0}, \boldsymbol{\Sigma}_t), \\ \boldsymbol{\Sigma}_t &= C_0 + C_1' \boldsymbol{\varepsilon}_t \boldsymbol{\varepsilon}_t' C_1, \end{aligned}$$

with ϱ being a diagonal matrix, and $\boldsymbol{\Sigma}_t$ being a variance-covariance matrix of shocks. Note that through $\boldsymbol{\Sigma}_t$ shocks to the discount factor can be correlated with shocks to local

[29] Clearly assuming that p_t is log-normally distributed is not reasonable since $p_t > 1$ is not legitimate for a probability. However, provided the likelihood that $p_t > 1$ is very small this is ar easonable approximation.

variables. The solution to the first order equation is:

$$\begin{aligned}\frac{1-\alpha-\gamma}{1-\alpha}\ln I_t &= c_0+\frac{1}{2}a\Sigma_t a'+\rho_p \ln p_t+\rho_\beta \ln \beta_t \\ &\quad +\rho_x \ln\frac{x_t}{x_{t-1}}+\frac{\rho_A}{1-\alpha}\ln A_t-\frac{\rho_w \alpha}{1-\alpha}\ln w_t-\ln R_t, \qquad (5)\end{aligned}$$

where c_0 is a constant, the ρ's are the persistent parameters in ϱ, and $a=[1,1,1,1/(1-\alpha), \alpha/(\alpha-1)]'$. Note that because of conditional heteroskedasticity of ε, investment is a linear function of lagged variances of the shocks. We allow for this possibility in our estimations.

This completes the analysis of investment decisions of a single subsidiary. Assume now that the domestic economy is composed of many identical firms and that every period new firms enter into this market, overlapping with firms already in place. An aggregate version of (5) holds for the economy as a whole provided all foreign subsidiaries face similar prices, productivity and discount factors, which we assume.

C Definition ofV ariables

Here we provide ad etailed description of the data. Unless noted we use an annual frequency.

Foreign Direct Investment/GDP: Ratio of Gross FDI inflows (in current US$) toG DP (in current US$). IMF Balance of Payments and The World Bank Global Development Finance.

T-Bill: US 3-month Treasury Bill rate taken from Bloomberg. Frequency: annual average (end of month price).

Stock Market Return: Percentage change of Morgan Stanley World Capital Index from Bloomberg. Frequency: annual average (end of month price).

Slope: Slope of the US Term Structure from Bloomberg, computed as the 10 year Bond rate minus 3-month Treasury Bill rate. Frequency: annual average (end of month price).

Spread: US Credit Spread from Bloomberg, computed as Moody's AAA bond rate minus Moody's BAA bond rate. Frequency: annual average (end of month price).

U.S. inflation rate: Geometric average of current and last-year inflation rate. IMF International Financial Statistics.

World Growth: GDP weighted average of GDP growth rate (sample of countries with complete data). World Development Indicators.

GDP growth: Growth rate of real per capita GDP. Summers and Heston dataset and World Development Indicators.

Trade openness: Residual of a regression of the log of the ratio ofr eal exports plus imports (in 1995 US$) to real GDP (in 1995 US$) on the logs of area and population, and dummies for oil exporting and for landlocked countries (see Loayza, Fajnzylber, and Calderón 2002). World Development Indicators.

Financial Depth: Ratio of private credit by deposit banks and other financial institutions to GDP (Beck, Levine, and Demirguç-Kunt 2000).

Government consumption: Ratio of general government final consumption expenditure to GDP. World Development Indicators.

Institutional quality: Civil liberties (0,1). Higher scores indicate more liberties. Freedom House: Freedom in the World.

REER growth: Growth rate of real effective exchange rate. IMF International Financial Statistics.

REER volatility: Standard deviation of real effective exchange rate percentage changes. IMF International Financial Statistics.

GDP growth volatility: Standard deviation of growth rate of real per capita GDP. Summers and Heston dataset and World Development Indicators.

Terms of Trade volatility: Standard deviation of terms of trade percentage changes. World Development Indicators.

Wages: Average annual rate of wages and salaries in the manufacturings ector, expressed in constant 1995 US$. United Nations: Industrial Development Organization.

Traded Value to GDP: Ratio of total shares traded on the stock market exchange to GDP (Beck, Levine, and Demirguç-Kunt 2000).

Official liberalization: Dummy variable that takes the value of one if the equity market is liberalized based on the chronology in Bekaert and Harvey (2000).

First sign: Dummy variable that takes the value of one if there is either an official liberalization or ADR and country fund introduction.

Investability: Ratio of capitalization of the IFC "investable" to the "global" stocks in a country as in Edison and Warnock (2001).

Balance of Payments Restrictions: Simple average of (0,1) scores for the following categories of balance of payments restrictions: multiple exchange rate practices,c urrent-account restrictions, capital-account restrictions, and surrender of export proceeds. IMF Exchange Arrangements and Exchange Restrictions.

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Figure 1
Histogram of the global factor country-specific coefficient estimates for developing and developed countries

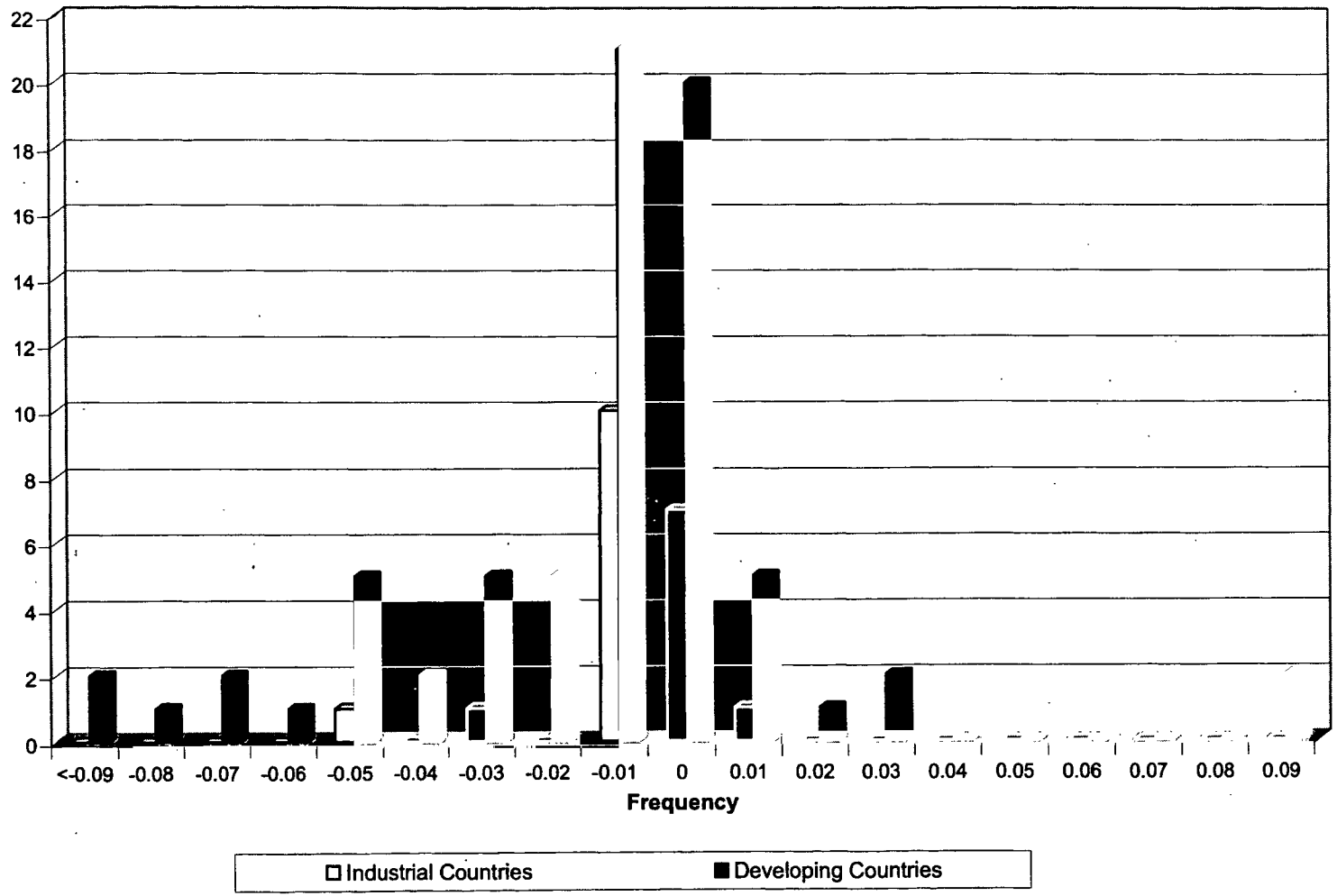
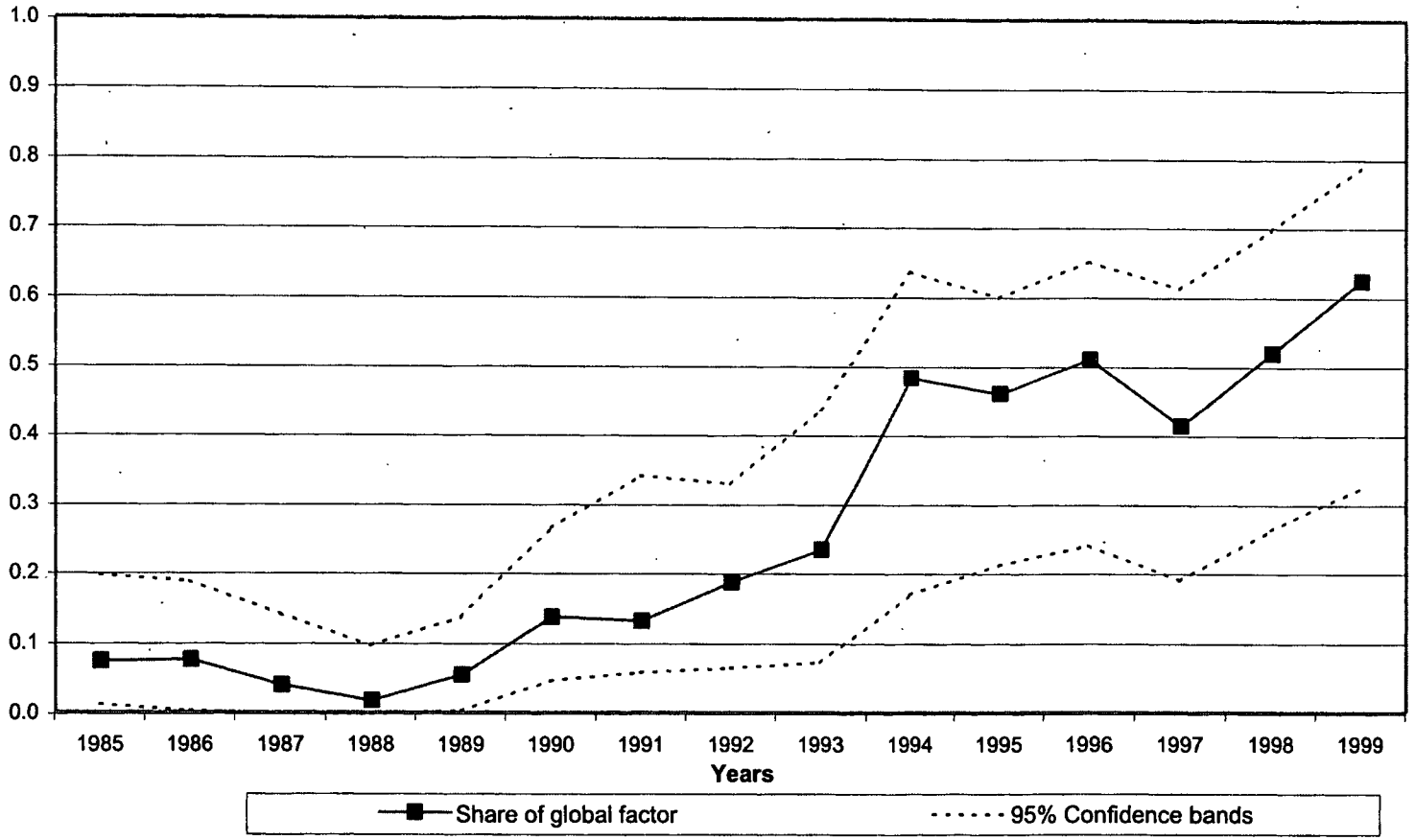


Figure 2 a. Globalization Measure
Share of explained FDI variance accounted for by global factors, full sample



Note: Confidence bands are constructed through a bootstraping procedure using 800 replications per subsample.

Figure 2 b. Globalization Measure
Share of explained FDI variance accounted for by global factors, by income group

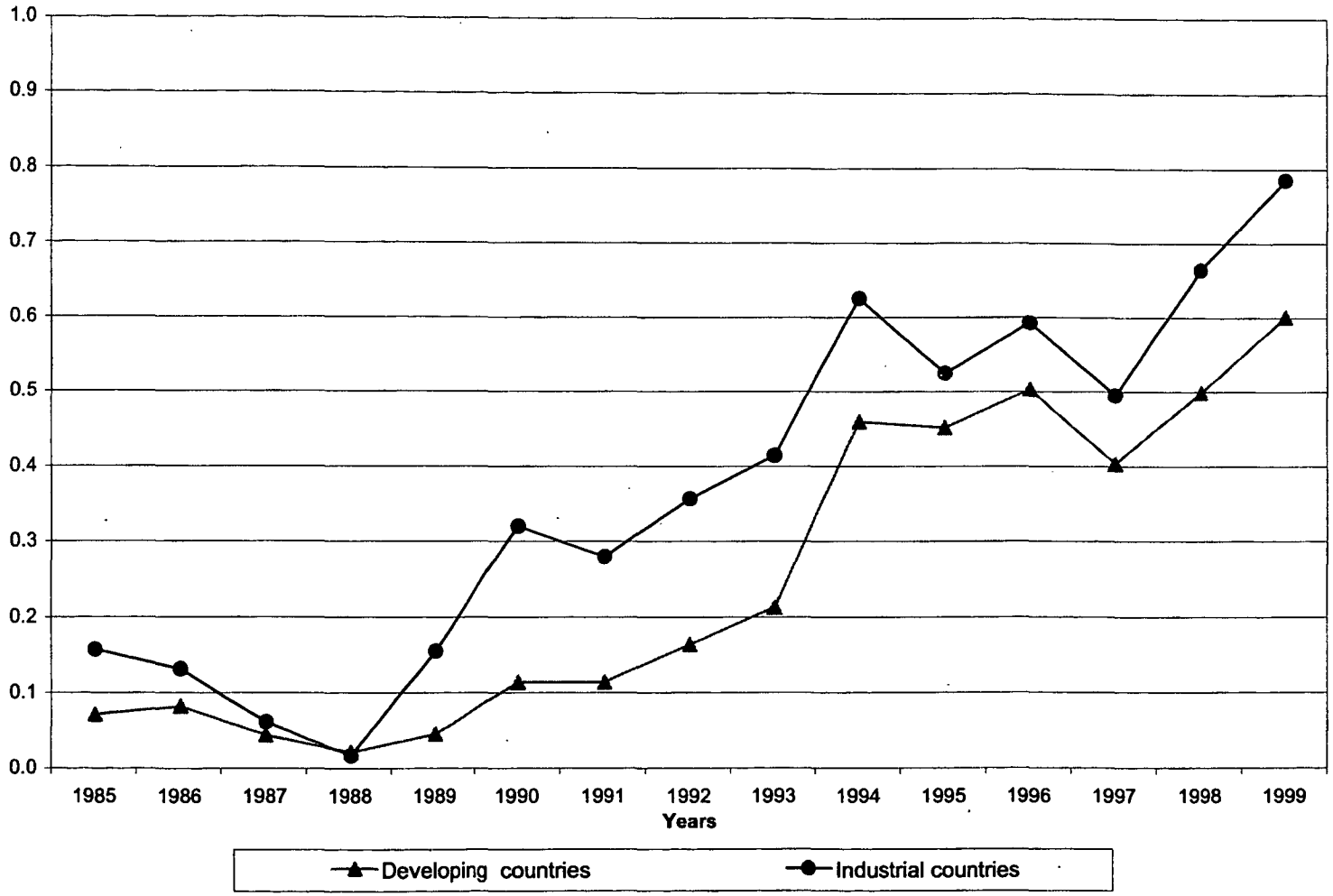


Figure 3
Total and Within R-square for rolling FDI regressions of 16-year windows, end year plotted

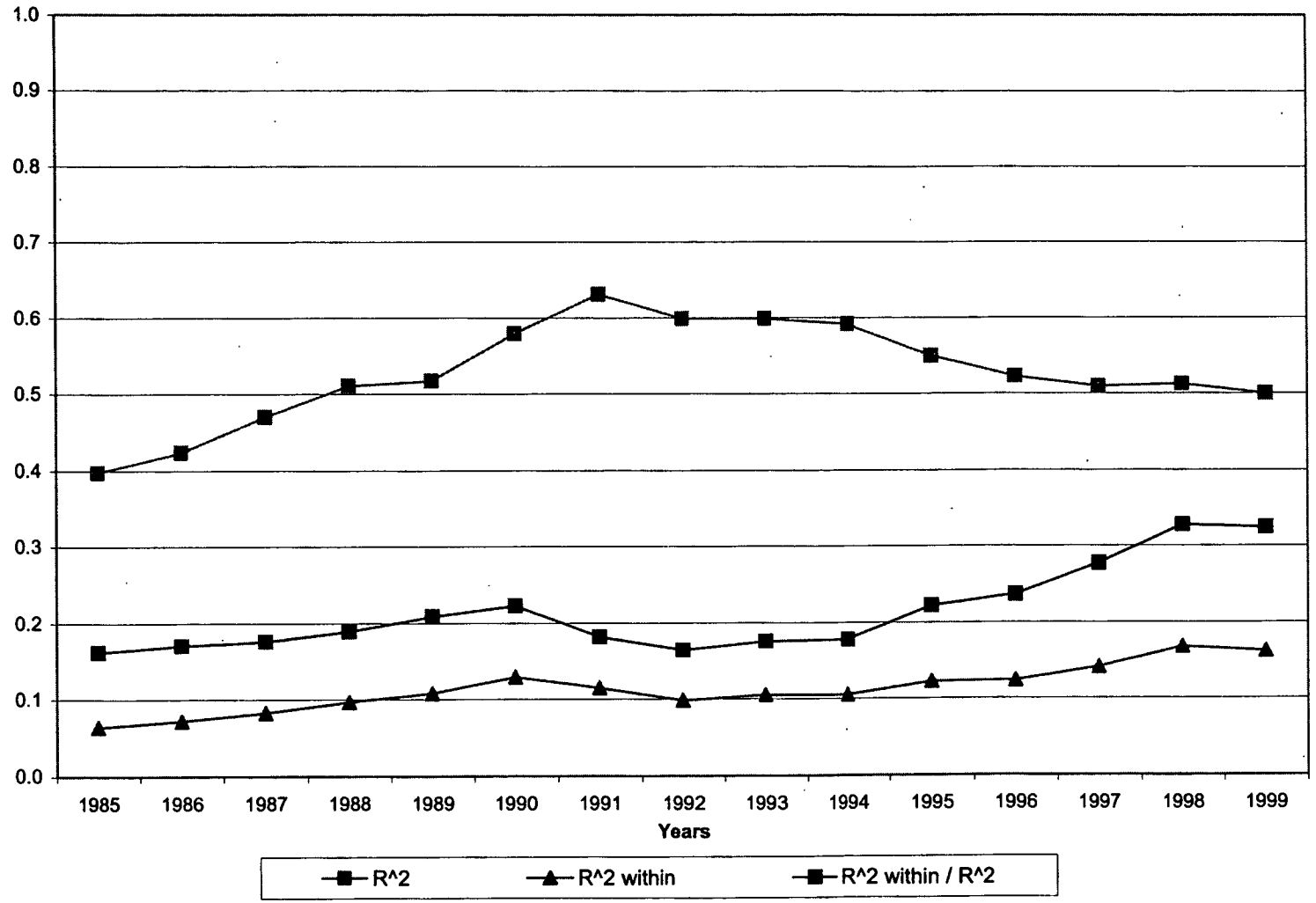


Figure 4. Globalization Measure
Share of explained FDI variance accounted for by global factors, by geographic region

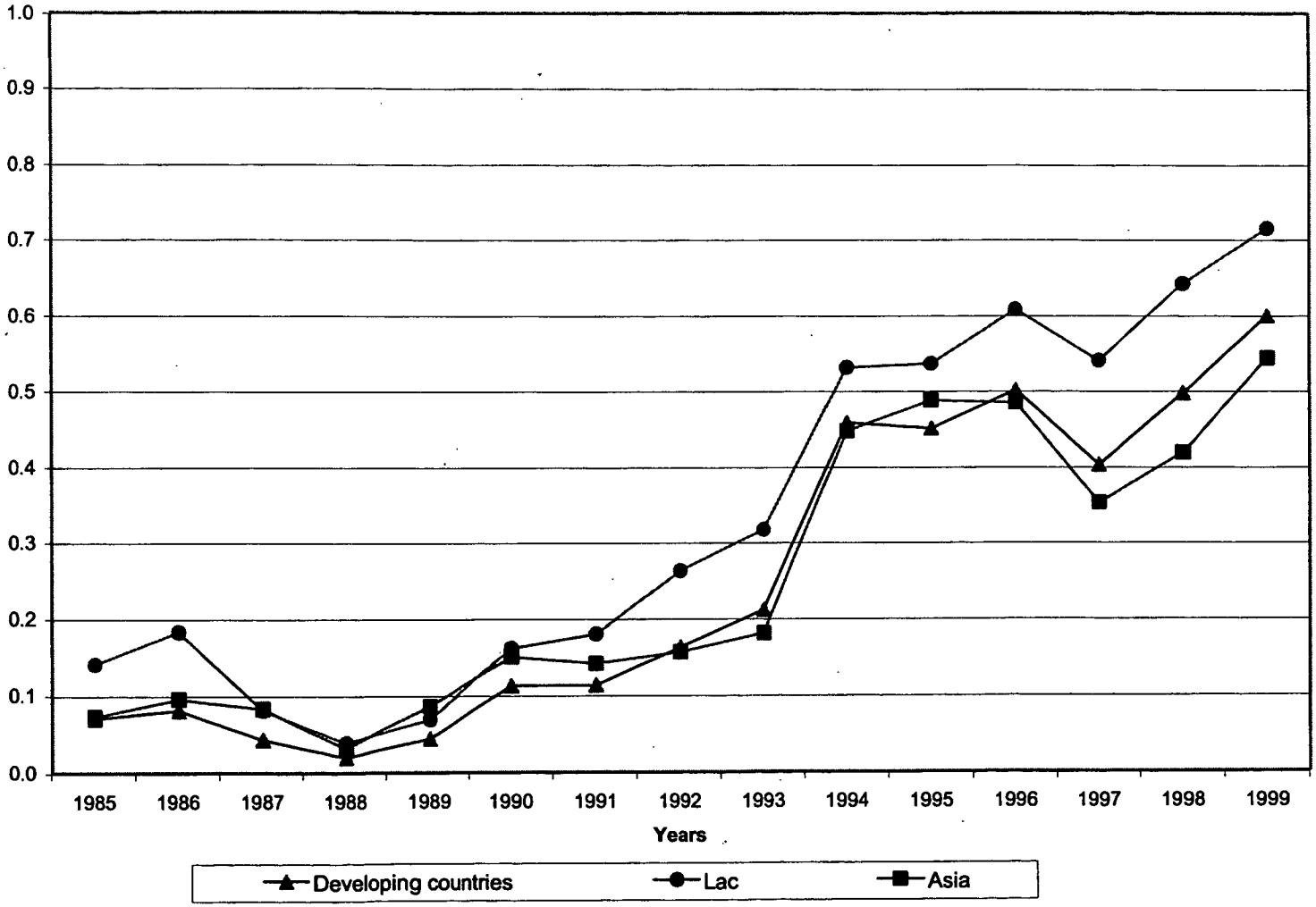


Figure 5
FDI explained by global factor, relative to mean FDI

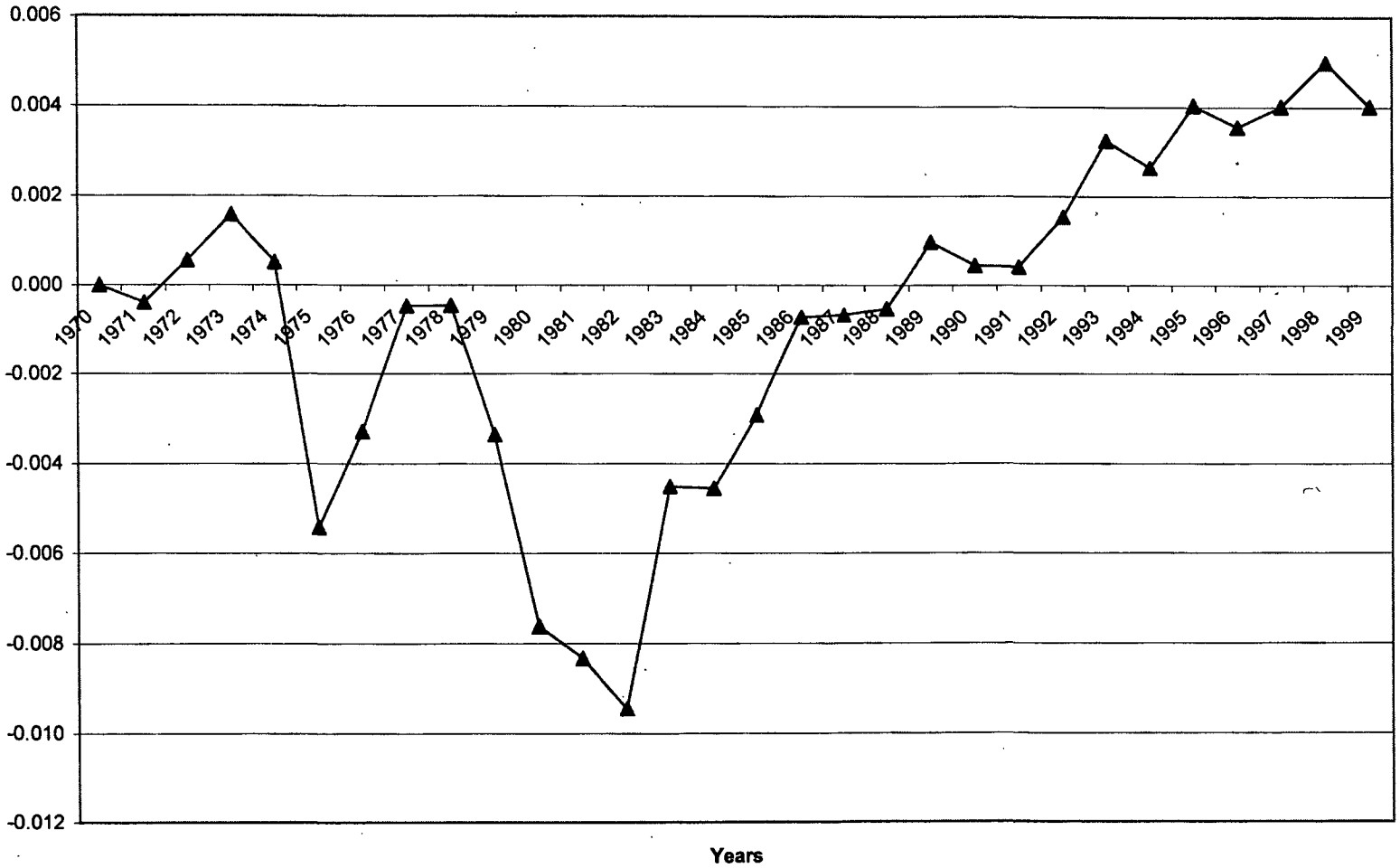


Table 1: Descriptive Statistics

Variable	*Mean*	*Median*	*Dtd dev*	*Minimum*	*Maximum*
FDI/GDP	0.018	0.010	0.027	-0.122	0.316
T-Bill rate	6.288	5.825	2.245	3.019	14.078
Stock market return	12.463	13.366	13.283	-21.907	51.769
Yield curve slope	1.835	2.155	1.039	-0.318	3.550
Credit spread	1.068	0.945	0.409	0.603	2.326
U.S. Inflation	4.258	3.605	2.319	1.335	9.254
World growth	0.032	0.032	0.013	0.006	0.066
Global	-0.085	-0.206	0.708	-1.076	1.667
GDP growth	0.021	0.026	0.050	-0.365	0.319
Trade openness	0.021	0.053	0.505	-1.697	1.542
Financial depth	0.433	0.287	0.378	0.011	2.290
Government consumption	0.155	0.145	0.060	0.030	0.460
REER growth	0.005	0.006	0.116	-0.706	1.230
Institutional quality	0.595	0.670	0.304	0	1
REER volatility	0.084	0.059	0.079	0.003	0.728
GDP growth volatility	0.037	0.028	0.031	0.002	0.393
ToT volatility	0.089	0.064	0.090	0	0.807

Table 2: Determinants of FDI. Multiple Global and Local Variables.
Model 1: Homogeneous slope coefficients and country-specific intercepts.

Variable	*All countries*	*Industrial countries*	*Developing countries*
T-Bill	-0.0013 **	-0.0015 *	-0.0013 **
	0.0003	*0.0007*	*0.0004*
Stock Market Return	2.38E-05	3.78E-06	2.34E-05
	3.62E-05	*3.70E-05*	*4.79E-05*
Slope	-0.0035 **	-0.0035 **	-0.0034 **
	0.0006	*0.0013*	*0.0007*
Spread	0.0003	0.0070	-0.0018
	0.0026	*0.0054*	*0.0031*
U.S. Inflation	-0.0006 *	-0.0006	-0.0005
	0.0003	*0.0005*	*0.0004*
World Growth	-0.0961 **	-0.1046	-0.0970 **
	0.0382	*0.0750*	*0.0467*
GDP growth	0.0350 **	0.0732 **	0.0317 **
	0.0134	*0.0266*	*0.0143*
Trade openness	0.0115 **	0.0238 **	0.0101 **
	0.0026	*0.0090*	*0.0027*
Financial depth	0.0075 **	-0.0003	0.0137 **
	0.0031	*0.0044*	*0.0048*
Government consumption	-0.0709 **	-0.1551 **	-0.0659 **
	0.0228	*0.0563*	*0.0250*
REER growth	-0.0012	-0.0080	-0.0001
	0.0039	*0.0068*	*0.0043*
Institutional quality	0.0018	0.0086	-0.0005
	0.0030	*0.0053*	*0.0035*
REER volatility	-0.0081	-0.0024	-0.0079
	0.0070	*0.0147*	*0.0077*
GDP growth volatility	-0.0976 **	-0.0412	-0.0936 **
	0.0206	*0.0626*	*0.0212*
ToT volatility	-0.0021	0.0262	-0.0014
	0.0112	*0.0203*	*0.0116*
# Observations	1926	482	1444
# Countries	94	20	74
R-squared total	0.4456	0.3935	0.4646
R-squared within	0.1341	0.2319	0.0947

Notes:
Standard errors in italics, below the corresponding coefficient estimate.
(**) 5% significance level and (*) 10% significance level.

Table 3: Determinants of FDI. Synthetic Global Factor and Multiple Local Variables.
Model 1: Homogeneous slope coefficients and country-specific intercepts.

Variable	*All countries*	*Industrial countries*	*Developing countries*
Global Factor	-0.0053 **	-0.0015	-0.0061 **
	0.0009	*0.0012*	*0.0011*
GDP growth	0.0318 **	0.0280	0.0306 **
	0.0134	*0.0223*	*0.0143*
Trade openness	0.0126 **	0.0278 **	0.0110 **
	0.0025	*0.0079*	*0.0026*
Financial depth	0.0075 **	-0.0016	0.0137 **
	0.0031	*0.0037*	*0.0048*
Government consumption	-0.0726 **	-0.1998 **	-0.0646 **
	0.0231	*0.0648*	*0.0250*
REER growth	-0.0009	-0.0078	0.0003
	0.0037	*0.0061*	*0.0040*
Institutional quality	0.0021	0.0084	-0.0003
	0.0029	*0.0053*	*0.0034*
REER volatility	-0.0083	-0.0052	-0.0086
	0.0069	*0.0144*	*0.0075*
GDP growth volatility	-0.1026 **	-0.0893	-0.0972 **
	0.0212	*0.0611*	*0.0217*
ToT volatility	-0.0029	0.0391 *	-0.0014
	0.0108	*0.0208*	*0.0112*
# Observations	1926	482	1444
# Countries	94	20	74
R-squared total	0.4388	0.3710	0.4453
R-squared within	0.1235	0.2035	0.1188

Notes:
Standard errors in italics, below the corresponding coefficient estimate
(**) 5% significance level and (*) 10% significance level.

Table 4: Determinants of FDI. Synthetic Global Factor and Multiple Local Variables.
Model 2: Heterogeneous global factor coefficients and country-specific intercepts.

Variable	WorldMaketIn	gaiMnkfTorldMaketIn	h I uIodLtasridMaketIn
fodFTuDll kdefTc	-0.0069 **	-0.0018	-0.0078 **
	0.0026	0.0020	0.0035
fh v rsedRkA	0.0268 **	0.0198	0.0268 **
	0.0103	0.0315	0.0115
beTi IrdLIaaInn	0.0198 **	0.0330 **	0.0182 **
	0.0028	0.0058	0.0033
DtaTaltTuILkA	0.0020	-0.0085 *	0.0077
	0.0038	0.0045	0.0053
fdu IeaqIakrIdanMqLktda	-0.0431 *	-0.1714 **	-0.0352
	0.0239	0.0612	0.0273
NmnNrsedRkA	-0.0010	-0.0097	-0.0002
	0.0040	0.0089	0.0046
ganktkkkTo MTkz	0.0016	0.0035	0.0013
	0.0036	0.0062	0.0043
NmnNrudoTtkz	-0.0098	-0.0037	-0.0098
	0.0082	0.0216	0.0093
fh v rsedRkAmkTktkz	-0.1009 **	-0.1154	-0.0965 **
	0.0201	0.0696	0.0223
bdb rudTktkz	-0.0162 **	0.0162	-0.0153 *
	0.0076	0.0365	0.0084
# Observations	1926	482	1444
# Countries	94	20	74
R-squared total	0.6897	0.6538	0.6959

Notes:
a/ Mean of the country-specific estimates
Standard errors in italics, below the corresponding coefficient estimate
(**) 5% significance level and (*) 10% significance level.

Table 5: Globalization Measure
Share of explained FDI variance by global and local variables

Year	Globalization measure			*R-square al*	*R-square within al*
	All countries	*Developing countries*	*Industrial countries*		
1985	0.073	0.069	0.154	0.398	0.064
1986	0.075	0.080	0.129	0.423	0.072
1987	0.039	0.042	0.059	0.470	0.083
1988	0.017	0.019	0.014	0.511	0.097
1989	0.054	0.043	0.152	0.517	0.108
1990	0.136	0.111	0.317	0.580	0.129
1991	0.130	0.112	0.277	0.631	0.115
1992	0.186	0.161	0.354	0.599	0.098
1993	0.233	0.210	0.412	0.599	0.105
1994	0.481	0.457	0.624	0.592	0.105
1995	0.459	0.449	0.522	0.550	0.122
1996	0.508	0.500	0.591	0.522	0.124
1997	0.412	0.401	0.492	0.509	0.141
1998	0.517	0.496	0.662	0.512	0.168
1999	0.622	0.599	0.783	0.500	0.162

Note:
a/ R-squares computed using the sample of all countries.

Table 6: Global Factors and Liberalization
Slope coefficient of regressing the globalization measure on a liberalization variable

	Official Liberalization	*First Sign*	*Investability*	*Balance of Payments Restrictions*
All Countries	2.98[/a] **	3.42 **	3.93 **	-0.91 **
	0.585[/b]	*1.088*	*1.062*	*0.180*
	0.652[/c]	0.399	0.566	0.747
Industrial Countries	31.40 **	31.40 **	32.65 **	-0.94 **
	10.08	*10.08*	*13.27*	*0.182*
	0.157	0.157	0.178	0.602
Developing Countries	0.47 **	0.64 **	0.70 **	-0.42 **
	0.072	*0.165*	*0.120*	*0.073*
	0.692	0.485	0.718	0.723
Latin America	0.43 **	0.52 **	0.54 **	-0.28 **
	0.079	*0.167*	*0.117*	*0.053*
	0.603	0.303	0.659	0.761
Asia	0.52 **	0.72 **	1.16 **	-0.07
	0.090	*0.237*	*0.289*	*0.619*
	0.676	0.364	0.673	0.002

Notes:
a/ Slope coefficient.
b/ Robust standard error.
c/ R-squared.
(**) 5% significance level and (*) 10% significance level.

Table 7: Determinants of FDI. Extensions.

Variable	Homogeneous slope coefficients and country-specific intercepts				Heterogeneous slope coefficients on global factor
	Wages	*Traded Value to GDP*	*Privatizations*	*BoP Restrictions*	
T-Bill	-0.0012 **	0.0004	-0.0013 **	-0.0005 *	-0.0007 **
	0.0004	*0.0003*	*0.0003*	*0.0003*	*0.0003*
Stock Market Return	-4.26E-06	-4.20E-05 *	4.47E-05	1.22E-05	-2.62E-05
	3.81E-05	*2.53E-05*	*3.64E-05*	*3.49E-05*	*2.17E-05*
Slope	-0.0030 **	-0.0007	-0.0037 **	-0.0017 **	-0.0031 **
	0.0007	*0.0006*	*0.0006*	*0.0006*	*0.0006*
Spread	0.0036	-0.0050 **	0.0024	-0.0040 *	-0.0031 **
	0.0028	*0.0019*	*0.0027*	*0.0023*	*0.0011*
U.S. Inflation	-0.0004	-0.0009 **	-0.0003	-0.0001	-0.0013 **
	0.0003	*0.0003*	*0.0003*	*0.0003*	*0.0003*
World Growth	-0.0651	-0.1522 **	-0.0377	-0.0666 *	-0.1703 **
	0.0470	*0.0433*	*0.0414*	*0.0387*	*0.0214*
GDP growth	0.0398 **	0.0345 **	0.0317 **	0.0332 **	0.0285 **
	0.0179	*0.0112*	*0.0133*	*0.0136*	*0.0100*
Trade openness	0.0117 **	0.0009	0.0096 **	0.0059 **	0.0163 **
	0.0032	*0.0033*	*0.0026*	*0.0025*	*0.0029*
Financial depth	0.0106 **	-0.0025	0.0060 **	0.0067 **	-0.0010
	0.0037	*0.0020*	*0.0030*	*0.0026*	*0.0039*
Government consumption	-0.1049 **	-0.0780 **	-0.0777 **	-0.0730 **	-0.0556 **
	0.0284	*0.0239*	*0.0226*	*0.0233*	*0.0236*
REER growth	0.0009	0.0004	-0.0014	-0.0001	-0.0008
	0.0042	*0.0050*	*0.0038*	*0.0038*	*0.0039*
Institutional quality	0.0058	0.0073 **	0.0018	0.0001	-0.0001
	0.0034	*0.0030*	*0.0030*	*0.0028*	*0.0036*
REER volatility	-0.0077	0.0074	-0.0082	0.0039	-0.0099
	0.0085	*0.0072*	*0.0070*	*0.0066*	*0.0081*
GDP growth volatility	-0.1174 **	-0.1427 **	-0.0945 **	-0.0890 **	-0.1004 **
	0.0315	*0.0295*	*0.0208*	*0.0232*	*0.0201*
ToT volatility	-0.0096	-0.0125	0.0015	-0.0054	-0.0149 *
	0.0100	*0.0139*	*0.0112*	*0.0113*	*0.0077*
Wages	-1.21E-07 **				
	5.90E-07				
Traded Value to GDP		0.0057 **			
		0.0026			
Privatizations			0.0075 **		
			0.0018		
BoP Restrictions				-0.0015 **	
				0.0006	
Global effect a/					1.0669 **
					0.2134
# Observations	1215	939	1926	1743	1926
# Countries	64	70	94	88	94
R-squared total	0.3794	0.6311	0.4815	0.4671	0.6975
R-squared within	0.1768	0.2619	0.1434	0.1014	n.a.

Notes:
Standard errors in italics, below the corresponding coefficient estimate
a/ Average of country specific coefficients
(**) 5% significance level and (*) 10% significance level.

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